

IN THE UNITED STATES PATENTS AND TRADEMARK OFFICE

Application of : Tomohiro Oshiyama et al.
Serial No. : 10/590,158
Filed : August 21, 2006
For : MATERIAL FOR ORGANIC
ELECTROLUMINESCENCE ELEMENT, ORGANIC
ELECTROLUMINESCENCE ELEMENT, DISPLAY
DEVICE AND ILLUMINATION DEVICE
Art Unit : 1794
Examiner : MICHAEL H. WILSON

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Tomohiro OSHIYAMA, hereby declare and say as follows:

That I am a post graduate from Tsukuba University having been awarded a Master's degree in Science and Engineering in March 1993.

That since April 1993, I have been employed by Konica Corporation (at present: Konica Minolta Technology Center, Inc.). During my employment, I have been engaged in the research and development of photographic materials and organic electroluminescent elements in the Research and Development Laboratory of my company.

That I am one of the inventors of the present application.

That I am familiar with the subject matter of the present invention.

Experimental

The following experiments were carried out by Tomohiro OSHIYAMA, one of the inventors of the present application.

The purposes of the present experiments are as follows:

1. In pages 6-7 of the outstanding Office Action, claims 7 and 8 are rejected as anticipated or obvious over Kita et al.

The Examiner states that, in complex 111 ([0082]) of Kita et al., free rotation of the aryl group is blocked by phenyl groups being present on the R_1 , R_3 and R_4 positions. However, the phenyl groups being present on the R_1 , R_3 and R_4 positions (R_1 , R_3 and R_4 being explained in [0082] of Kita et al.) of complex 111 of Kita et al. are not considered to be aryl groups of which free rotation is blocked. The case of the above phenyl groups at R_1 , R_3 and R_4 positions of complex 111 is not included in the examples of an aryl group or an aromatic heterocycle group of which free rotation is blocked in pages 33-46 of the present Specification. Accordingly, a first purpose of the present Experiments is to show that complex 111 of Kita et al. (with $m=1$ and $n=1$ (shown below) as the Examiner discussed in page 6 of the outstanding Office Action) is not the platinum complex within the scopes of claims 7 and 8 of the present Application.

2. In pages 7-8 of the outstanding Office Action, claims 5 and 6 are rejected as being unpatentable over Kita et al.

The Examiner states, in pages 7 of the outstanding Office Action, that the reference demonstrates phenyl and methyl groups are suitable for the R₁ and R₂ positions of the same ligand (compound 10, table 1 [0048] page 8). However, compound 10 is an iridium complex and Kita et al. disclose no platinum complex having phenyl and methyl groups in the R₁ and R₂ positions, R₁ and R₂ being explained in [0043] of Kita et al. The Examiner also states, in pages 8 of the outstanding Office Action, that it would be obvious to one of ordinary skill in the art at the time of the invention to reverse the phenyl and methyl groups of R₁ and R₂ in the ligand of compound 10 ([0048] page 8) and use the ligand as part of a platinum complex resulting in a complex of instant formulae (3) and (4). Accordingly, a second purpose of the present Experiments is to show that the properties of the platinum complex having phenyl and methyl groups in the R₁ and R₂ positions are unexpectedly superior to the properties of compound 10 of Kita et al., which is an iridium complex, when these compounds are used in an organic EL element. The properties of following platinum complexes 10-C and 10-D having the same ligands as A and B, respectively, of compound 10 of Kita et al. ([0043]) were compared with following iridium complexes 10-A and 10-B which correspond to above A and B of compound 10 of Kita et al., in the organic EL elements.

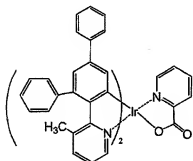
3. In pages 9-10 of the outstanding Office Action, claims 7 and 8 are rejected as being unpatentable over Kamatani et al.

The Examiner states, in pages 10 of the outstanding Office Action, that the reference (Kamatani et al.) does not explicitly disclose the carbazolyl substituent bound to the R_1 position, however, such a compound would be a positional isomer of the explicitly disclosed complexes of Kamatani et al. and that compounds which are position isomers are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties.

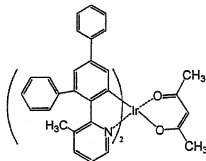
However, with respect to the rotation of such a large substituent of carbazole, the R_1 position of the partial structure Ph in [0082] page 6 of Kamatani et al. is quite different from the R_2 and R_3 positions of the same partial structure Ph because of the steric hindrance due to the neighboring pyridine ring P1 shown in page 8 of Kamatani et al., when a pyridine ring P1 is attached to the partial structure Ph as in compounds 36 and 38 in page 9 of Kamatani et al. In Compound 12 in page 35 of the present Application, a carbazolyl substituent bound to the position corresponding to the above R_1 position of the partial structure Ph of Kamatani et al. is cited as one of the examples of an aromatic heterocycle of which free rotation is blocked, while a carbazolyl substituents bound to the positions corresponding to the R_2 and R_3 positions of the same partial structure Ph of Kamatani et al. are not included as such examples. Accordingly, a third purpose of the present Experiments is to show that the free rotation of a carbazolyl substituent bound to the R_1 position of the partial structure Ph of Kamatani et al. is blocked, while the rotation of carbazolyl substituents bound to the R_2 and R_3

positions of the same partial structure are free, by comparing the properties of compound 12 in page 45 of the present Application having a carbazolyl substituent bound to the position corresponding to the above R_1 position with the properties of following compounds 12-A and 12-B which correspond to compound 36 and 38, respectively, in page 9 of Kamatani et al. having carbazolyl substituents bound to the above R_2 and R_3 positions, respectively, in the organic EL elements.

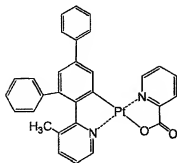
10-A



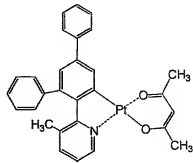
10-B



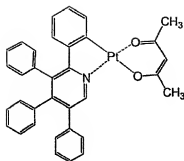
10-C



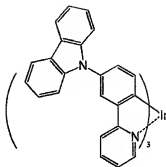
10-D



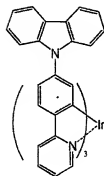
111



12-A



12-B



Organic EL elements OLED2-32 through OLED2-39 were prepared in the same manner as described in page 137, line 1 - page 139, line 26 of the present Application except that the emission dopants were changed as shown in Table 2-continued.

The external quantum efficiency and the emission life of each of the organic EL elements OLED2-32 through OLED2-39 were evaluated as described in page 140, lines 5 - 23 of the present Application.

The results were listed in Table 2-continued. In Table 2-continued, each external quantum efficiency was expressed as a relative value when the value for Organic EL Element OLED2-1 was set to 100 and each emission life was expressed as a relative value when the value for Organic EL Elements OLED1-1 was set to 100.

Table 2-continued

Element No.	Emission Host	Emission Dopant	External Quantum Efficiency	Emission Life	Remarks
OLED2-1	CBP	Ir-1	100	100	Comp.
OLED2-32	CBP	111	101	105	Comp.
OLED2-33	CBP	10-A	102	100	Comp.
OLED2-34	CBP	10-B	100	105	Comp.
OLED2-35	CBP	10-C	112	133	Inv.
OLED2-36	CBP	10-D	110	135	Inv.
OLED2-37	CBP	12	115	153	Inv.
OLED2-38	CBP	12-A	90	80	Comp.
OLED2-39	CBP	12-B	85	92	Comp.

Inv.: Inventive, Comp.: Comparative

Conclusions:

1. OLED2-32 employing Complex 111 (with m=1 and n=1 shown above) showed a lower "external quantum efficiency" of 101 and a shorter "emission life" of 105 compared to those of the inventive samples in Table 2 (in page 143 of the present Application) and above Table 2-continued, suggesting that no phenyl group of which free rotation is blocked is contained in complex 111 ([0082]) of Kita et al.

2. Unexpectedly superior properties of platinum complexes having the same ligands as A and B of compound 10 of Kita et al. ([0043]) to the properties of iridium complexes A and B of compound 10 of Kita et al. ([0043]), when these complexes were used in the organic EL elements, were clearly demonstrated in Table 2-continued. Namely, OLED2-35 and OLED2-36 employing complexes 10-C and 10-D having the same ligands as A and B, respectively, of compound 10 of Kita et al. ([0043]) exhibited higher "external quantum efficiencies" and longer "emission lives" than those of OLED2-33 and OLED2-34 employing complexes 10-A and 10-B which correspond to above A and B of compound 10 of Kita et al. ([0043]).

3. OLED2-37 employing Complex 12 in page 45 of the present Application showed a higher "external quantum efficiency" and a longer "emission life" compared to those of OLED2-38 and OLED2-39, OLED2-38 employing above complex 12-A having a carbazolyl group in the R₂ position of the partial structure Ph in [0082] page 6 of Kamatani et al. and OLED2-39 employing above complex 12-B having a carbazolyl group in the R₃ position of the same partial structure Ph of Kamatani et al. The above result suggests that the rotation of the carbazolyl substituent bound to the R₁ position is blocked, while the rotation of the carbazolyl substituents bound to the R₂ and R₃ positions are free.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable

by fine or imprisonment, or both, under Section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: December 24, 2009

Tomchiro Oshiyama
TOMOHIRO OSHIYAMA